

REMARKS

Prompt considerations of the present divisional application, as amended, is respectfully requested. In the Office Action dated July 18, 2003 for parent application Serial No. 09/771,064, all then-pending claims were finally rejected. Like the prior substantive office actions, significant issue was made with the claims being apparatus claims. For example, the Action appeared to give no weight to limitations characterized as “essentially method limitations or statements of intended or desired use.” (7/18/03 Action p. 6) Applicants respectfully disagrees with these and all other rejections presented, but in an effort to speed prosecution and address the merits of the invention, Applicants had filed an Amendment with a Request for Continuing Examination (RCE), canceling the apparatus claims in favor of method claims. Applicants then received an Office Communication dated December 1, 2003 stating that, while the October 20th submission was *bona fide*, it would not be entered unless presented in a divisional application. The present divisional application has been filed as a result, but Applicants specifically reserve the right to pursue those and other apparatus claims in a continuing application.

As amended, the present application contains claims 16-45. Independent claims 16, 25, 29 are method claims, and independent claim 47 is an apparatus claim utilizing means plus function language pursuant to 35 U.S.C. §112 paragraph 6. Accordingly, all claim limitations should be given their proper weight. Further, given the subject matter overlap, examination of all claims in a single application is believed to be proper. As all claims are patentable over the art of record, a prompt notice of allowance is respectfully requested.

As the title indicates, the present invention is directed to detecting hydrogenous materials. Prior office actions have relied on U.S. Patent No. 4,864,142 to Gomberg, for example. However Gomberg is not directed to the detection of hydrogenous material. Rather Gomberg is

directed to detection of scattering from elemental nuclei which have resonance in their scattering cross-sections, specifically carbon, nitrogen, oxygen, sulfur, potassium and beryllium. (see col. 6, line 58- col. 7, line 10) These atoms (C, N, O, S, K, Be) all have nuclei of substantially greater mass than the mass of a neutron. Two things result from this substantial mass disparity. First, a neutron colliding with these heavier atoms loses little of its speed, and second, it can backscatter to the detector in a single scattering event. Because the neutron would travel at high speed both to and from the scattering target and because it undergoes only a single scattering event, the detection events for these interactions occur rather quickly. More specifically, the relevant time scale for these scattering events is the round-trip travel time for a fast neutron. Gomberg specifically describes utilizing this time scale, confirming that he is not detecting scattering from hydrogen. (“[T]he detector 20 is energized in synchrony so as to detect only those neutrons in a particular burst and having a transit time equal to the interval required to travel from the source to the object 22 being interrogated and back to the detector.” (col. 11, line 35-40).

By contrast, hydrogen has a nucleus with a mass on par with the mass of a neutron. This is significant because scattering events with hydrogen significantly slow or “thermalize” the neutron. Also, due to their similarities in mass, a single scattering event with hydrogen does not result in a directly backscattered neutron. In order for a neutron to backscatter from a target and interact with hydrogen, it must undergo multiple scattering events. Thus, because a neutron backscattered from hydrogen has been slowed and has necessarily undergone multiple scattering events, these detection events would occur at significantly later times relative to the interactions with the heavier elements (C, N, O, S, K, Be) that are the focus of Gomberg.

In view of this, prompt reconsideration of the present application, as amended, is respectfully requested. As all pending claims are patentable over the art. The undersigned would welcome a telephone call to discuss any matter that would expedite prosecution of the present application.

Respectfully Submitted,

A handwritten signature in black ink, appearing to read "John M. Bradshaw", written over a horizontal line.

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